Correction of Risk Evaluation Calculations Waukegan Harbor RI/FS, Waukegan, Illinois WA No. 042-RICO-0528, Contract No. EP-S5-06-01

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In September 2008, the USEPA evaluated the human health risks to the high-end consumers of fish from Waukegan Harbor. In the memorandum, the USEPA noted an error in the calculations performed in 2006 by CH2M HILL in the evaluation of the polychlorinated biphenyl (PCB) cleanup level for sediments in the harbor (Clark, 2008). The findings of CH2M HILL's review of USEPA's memorandum and the 2006 calculations are presented below.

Upon review of the calculations and summary tables, the following errors were found and corrected. The revised tables have been attached to this memorandum.

Table	PCB (USEPA Oral Reference Dose for Hazard Quotient = 1.0	Reported Value	Correct Value
Table 3-2	RME Case	0.16	0.09
Table 3-6	RME Case	1.13	0.68
Table 3-7	RME Case	0.32	0.19
Table A-1	RME Case	0.16	0.09

The calculation errors did not significantly affect the conclusions of the report. The results indicate that none of the estimated risk-based concentration for PCBs in sediment (RBCsed) for non-carcinogenic endpoints (Hazard Quotient, HQ=1) is below the proposed sediment cleanup goal of a surface-weighted average concentration (SWAC) of 0.25 milligrams per kilogram (mg/kg) when using the 2003 to 2005 dataset. When considering the more conservative 2001 to 2005 fish tissue dataset, the RBCsed is estimated to be 0.2 mg/kg for the unrestricted consumption category (225 meals per year) and for the reasonable maximum exposure (RME) case (59 grams per day). Under this scenario, the RBCsed is slightly below the proposed goal of a SWAC of 0.25 mg/kg.

References

CH2M HILL. 2006. *Risk Evaluation for Development of a PCB Sediment Cleanup Level, Waukegan Harbor Area of Concern, Waukegan, Illinois*. July.

Clark Milt. 2008. *Evaluation of Human Health Risks/PCB Cleanup Levels at Waukegan Harbor*. Memorandum to Kevin Adler/USEPA. September 10.

TABLE 3-2

Risk-Based Concentrations for Polychlorinated Biphenyls in Fish Tissue
Fish Consumption Scenario
Waukegan Harbor, IL

Chemical	Target Risk	Risk-Based Concentration (mg/kg-wet)					
		CTE Case[a]	RME Case[b]	6 meals/year[c]	12 meals/year[c]	52 meals/year[c]	225 meals/yr[c]
PCB (USEPA Oral Reference Dose)	HQ=1.0	0.37	0.09	--	--	--	--
PCB (Great Lakes Health Protection Value)	HQ=1.0	--	--	3.78	1.89	0.44	0.10
PCB (USEPA Oral Slope Factor)	ELCR=$1x10^{-4}$	2.18	0.55	8.83	4.41	1.02	0.23
PCB (USEPA Oral Slope Factor)	ELCR=$1x10^{-5}$	0.22	0.06	0.88	0.44	0.10	0.02
PCB (USEPA Oral Slope Factor)	ELCR=$1x10^{-6}$	0.022	0.006	0.088	0.044	0.010	0.002

a. The central tendency exposure (CTE) case assumes a fish ingestion intake of 15 grams per day, based on the average of results from West et al. (1989) and West et al. (1993).

b. The reasonable maximum exposure (RME) case assumes a fish ingestion intake of 59 grams per day, based on results from West et al. (1989) and West et al. (1993).

c. These consumption rates correspond to the fish advisory groupings currently used by IEPA, as outlined in the Protocol for a *Uniform Great Lakes Sports Fish Consumption Advisory* (GLSFATF, 1993).

TABLE 3-6

Risk-Based Concentrations for Polychlorinated Biphenyls in Sediment

Recreational Angler Scenario[a]

Waukegan Harbor, IL

Chemical	Target Risk	Sediment PCB Concentration (mg/kg-dry)					
		CTE Case[b]	RME Case[c]	6 meals/year[d]	12 meals/year[d]	52 meals/year[d]	225 meals/yr[d]
2003-2005 Fish Tissue Data Set BSAF =	1.40E-01						
PCB (USEPA Oral Reference Dose)	HQ=1.0	2.66	0.68	--	--	--	--
PCB (Great Lakes Health Protection Value)	HQ=1.0	--	--	26.94	13.47	3.12	0.71
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-4}	15.5	3.94	62.9	31.4	7.27	1.66
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-5}	1.55	0.39	6.29	3.14	0.73	**0.17**
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-6}	**0.16**	**0.04**	0.63	0.31	**0.07**	**0.02**

a. The recreational angler scenario assumes that fish in the diet are comprised of gamefish only.

b. The central tendency exposure (CTE) case assumes a recreational angler fish ingestion intake of 15 grams per day, based on the average of results from West et al. (1989) and West et al. (1993).

c. The reasonable maximum exposure (RME) case assumes a recreational angler fish ingestion intake of 59 grams per day, based on results from West et al. (1989) and West et al. (1993).

d. These consumption rates correspond to the fish advisory groupings currently used by IEPA, as outlined in the Protocol for a *Uniform Great Lakes Sports Fish Consumption Advisory* (GLSFATF, 1993).

Bolded value is less than the target sediment cleanup level of 0.25 mg/kg

TABLE 3-7

Risk-Based Concentrations for Polychlorinated Biphenyls in Sediment

High-End Consumer Scenario[a]

Waukegan Harbor, IL

Chemical	Target Risk	Sediment PCB Concentration (mg/kg-dry)					
		CTE Case[b]	RME Case[c]	6 meals/year[d]	12 meals/year[d]	52 meals/year[d]	225 meals/yr[d]
2001-2005 Fish Tissue Data Set BSAF =	4.98E-01						
PCB (USEPA Oral Reference Dose)	HQ=1.0	0.75	**0.19**	--	--	--	--
PCB (Great Lakes Health Protection Value)	HQ=1.0	--	--	7.59	3.80	0.88	**0.20**
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-4}	4.37	1.11	17.7	8.86	2.05	0.47
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-5}	0.44	**0.11**	1.77	0.89	**0.20**	**0.05**
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-6}	**0.04**	**0.01**	**0.18**	**0.09**	**0.02**	**0.005**
2003-2005 Fish Tissue Data Set BSAF =	2.02E-01						
PCB (USEPA Oral Reference Dose)	HQ=1.0	1.84	0.47	--	--	--	--
PCB (Great Lakes Health Protection Value)	HQ=1.0	--	--	18.70	9.35	2.16	0.49
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-4}	10.8	2.74	43.6	21.8	5.04	1.15
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-5}	1.08	0.27	4.36	2.18	0.50	**0.12**
PCB (USEPA Oral Slope Factor)	ELCR=1x10^{-6}	**0.11**	**0.03**	0.44	**0.22**	**0.05**	**0.01**

a. The high-end consumer scenario assumes that fish in the diet are comprised of 25 percent bottomfish and 75 percent gamefish.

b. The central tendency exposure (CTE) case assumes a fish ingestion intake of 15 grams per day, based on the average of results from West et al. (1989) and West et al. (1993).

c. The reasonable maximum exposure (RME) case assumes a fish ingestion intake of 59 grams per day, based on results from West et al. (1989) and West et al. (1993).

d. These consumption rates correspond to the fish advisory groupings currently used by IEPA, as outlined in the Protocol for a *Uniform Great Lakes Sports Fish Consumption Advisory* (GLSFATF, 1993).

Bolded value is less than the target sediment cleanup level of 0.25 mg/kg

TABLE A-1

Risk-Based Concentrations for Polychlorinated Biphenyls in Fish Tissue (Noncancer Endpoint)

Fish Consumption Scenario

Waukegan Harbor, IL

Chemical	Oral Reference Dose (mg/kg-day)	Risk-Based Concentration (mg/kg-wet)					
		CTE Case[a]	RME Case[b]	6 meals/year[c]	12 meals/year[c]	52 meals/year[c]	225 meals/yr[c]
PCB (USEPA Oral Reference Dose)	0.00002	0.37	0.09	--	--	--	--
PCB (Great Lakes Health Protection Value)	0.00005	--	--	3.78	1.89	0.44	0.10

EXPOSURE PARAMETERS:						
Target hazard index	1.0	1.0	1.0	1.0	1.0	1.0
Adult body weight (kilograms)	70	70	70	70	70	70
Averaging time (years)	30	30	30	30	30	30
Exposure frequency (days/year)	365	365	365	365	365	365
Exposure duration (years)	30	30	30	30	30	30
Fraction of total fish diet coming from Waukegan Harbor	0.5	0.5	0.5	0.5	0.5	0.5
Average daily fish ingestion rate (grams/day)	15	59	3.7	7.4	32	140
Reduction from cooking/cleaning (fraction)	0.5	0.5	0.5	0.5	0.5	0.5

a. The central tendency exposure (CTE) case assumes a fish ingestion intake of 15 grams per day, based on the average of results from West et al. (1989) and West et al. (1993).

b. The reasonable maximum exposure (RME) case assumes a fish ingestion intake of 59 grams per day, based on results from West et al. (1989) and West et al. (1993).

c. These consumption rates correspond to the fish advisory groupings currently used by IEPA, as outlined in the Protocol for a *Uniform Great Lakes Sports Fish Consumption Advisory* (GLSFATF, 1993).